REMARKS

Claims 1-29 and 31-55 are pending in the application.

Claims 1-8, 10-29, 31-37 and 48-55 have been rejected.

Claim 1 has been amended.

Claims 38-47 have been allowed.

Rejection of Claims under 35 U.S.C. §112

Claim 1 stands rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. Applicant has amended the claim as suggested by the Examiner on page 2 of the Office Action. Accordingly, Applicant believes that this rejection has been overcome.

Rejection of Claims under 35 U.S.C. §103(a)

Claims 1-6, 10-15, 17, 18, 24-26, 31, 32 and 55 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Oh et al. (USPN 5,583,499) (hereinafter referred to as "Oh") in view of Kraft (USPN 5,343,481) (hereinafter referred to as "Kraft"), Baggen (USPN 5,539,755) (hereinafter referred to as "Baggen"), and Wicker, Error Control Systems for Digital Communication and Storage, 1995, Prentice-Hall, Inc. p. 204 (hereinafter referred to as "Wicker").

The cited art fails to teach or suggest "extracting an error polynomial from the data signal, wherein the extracting comprises generating a plurality of minimum-degree polynomials based on no more than six equations," as recited in amended claim 1. Accordingly, Applicant respectfully traverses this rejection.

The Examiner relies upon Kraft and Wicker to teach the above cited feature of claim 1. The Examiner states that Kraft teaches "that for a three-error correcting BCH code, there are six components of the syndrome vector S1, S2, ..., S6. Each of these is a Galois Field quantity (col. 1, lines 60-63, Kraft)."

The Examiner then appears to equate the six syndromes with the equations used to extract the minimum-degree polynomials in claim 1: "The examiner would like to point out that these are six syndrome equations." Office Action, p. 3. However, Applicants note that nothing in the cited portion of Kraft teaches or suggests that the syndromes are themselves equations (instead, Kraft simply states that each of the syndromes "is a Galois Field quantity") or that the syndromes are in any way usable to

generate a plurality of minimum-degree polynomials usable in the process of extracting an error polynomial. Thus, the syndromes described in the cited portion of Kraft appear to be completely unrelated to the equations recited in claim 1. Furthermore, there mere fact that Kraft describes a set of six syndromes (or six of anything for that matter) has no relationship whatsoever to the "no more than six equations" recited in claim 1.

The Examiner similarly relies upon Wicker, stating: "Wicker teaches t-error-correcting BCH code. Wicker also teaches that $\{X_l\}$ are error locators, for their values indicate the positions of the errors in the received word. We obtain a sequence of 2t algebraic syndrome equations in the v unknown error locations, S_1, S_2, S_3, S_4, ... S_{2t} (page 204, Wicker.)" Office Action, p. 3. Here, the Examiner appears to equate the syndrome equations with the equations recited in claim 1: "The examiner would like to point out that for 3-error correcting BCH code, there are six algebraic syndrome equations." Office Action, p. 3.

As with the Kraft reference, however, there is quite clearly no teaching or suggestion in the cited portion of Wicker that the syndrome equations are in any way usable to generate a plurality of minimum-degree polynomials or otherwise extract an error polynomial. Accordingly, the fact that there could be six syndrome equations is irrelevant, since the cited art neither teaches nor suggests that the syndrome equations (regardless of how many syndrome equations there actually are) be used in the same manner as the equations of claim 1.

Thus, neither Kraft nor Wicker, considered alone or in combination, teaches or suggests "extracting an error polynomial from the data signal, wherein the extracting comprises generating a plurality of minimum-degree polynomials based on no more than six equations." Instead, these two references simply teach that there may be six syndromes (Kraft) or six syndrome equations (Wicker). These references, both alone and in combination with the other cited art, quite clearly fail to teach or suggest generating a plurality of minimum-degree polynomials based on no more than six equations.

The cited art also fails to teach or suggest "extracting an error polynomial from the data signal, wherein the extracting comprises generating a plurality of minimum-degree polynomials... using no more than two branch decisions," as recited in amended claim 1.

The Examiner relies upon Kraft to teach this feature of claim 1, stating: "Kraft also teaches the binary tree of FIG. 2... the calculation means 4 in FIG. 1 (fig. 1, 2, col. 6, lines 2-34, Kraft). Kraft also teaches the control bits... FIG. 2 occurs (fig. 2, col. 6, lines 33-57). Office Action, p. 3. Applicants note that this description of Kraft fails to show how the cited portions of Kraft teach or suggest "generating a plurality of minimum-degree polynomials... using no more than two branch decisions."

Furthermore, the cited portions of Kraft, both alone and in combination with the other references, do not teach and suggest "generating a plurality of minimum-degree polynomials... <u>using no more than two branch decisions</u>." As shown in FIG. 2 of Kraft, traversal of the binary decision tree, which is used to select an error locator polynomial, involves three branch decisions. One decision occurs at element 13, another decision occurs at either element 12 or 23, and a final decision occurs at one of elements 14, 24, or 25. Kraft states:

> [T]he tree is traversed starting at its root 78 by first examining the syndrome component S_1 13. If this component is 0, a decision is made to go to the left; if not, a decision is made to go to the right. Thus at the second level of the tree either S_3 12 or the tree decision variable a 23 must be examined depending upon which side of the tree the first level decision led to... [E]ither the syndrome component S_5 14 or one of the tree decision variables b 24 or c 25 must be examined next. Kraft, col. 6, lines 8-19.

Accordingly, Kraft shows that at least three branch decisions are needed to traverse the binary tree. These three branch decisions clearly exceed the "no more than two branch decisions" recited in claim 1. Accordingly, Kraft fails to teach or suggest "generating a plurality of minimum-degree polynomials based on no more than six equations <u>having no more than two branch decisions</u>." Oh, Wicker, Kraft, and Baggen, which are not relied upon to teach this feature, also fail to teach or suggest this feature of claim 1.

For at least the foregoing reasons, claim 1 is patentable over the cited art, as are dependent claims 2-6 and 10-12. Claims 25-26, 31-32, and 55 are patentable over the cited art for similar reasons.

With respect to claim 13, the cited art fails to teach or suggest "feeding the syndromes to a plurality of Galois field multiply accumulators; [and]calculating a

plurality of minimum-degree polynomials associated with the BCH code, using the Galois field multiply accumulators;

The Examiner relies upon Baggen to teach "calculating a plurality of minimum-degree polynomials." Office Action, page 5. However, the minimum-degree polynomials in Baggen are not calculated by Galois field multiply accumulators, nor are the minimum-degree polynomials in Baggen generated based on syndromes (which are fed to the Galois field multiply accumulators that calculate the minimum-degree polynomials in claim 1). In fact, in Baggen, the syndromes appear to be dependent upon Baggen's minimum-degree polynomials: "S_j=r(x) mod m_j(x)." Baggen, col. 7, line 32. Given that Baggen's syndromes are dependent on Baggen's minimum-degree polynomials, it is quite clear that Baggen's minimum-degree polynomials could not be calculated by Galois field multiply accumulators into which the syndromes are fed, since such a configuration would require that the syndromes be available before the minimum-degree polynomials. None of the other references teach or suggest calculating minimum degree polynomials in the manner recited in claim 13, and thus this claim is clearly patentable over the cited art, as are its dependent claims 14-15, 17-18, and 24.

Claims 8, 16, 19-23, 27-29, and 33-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Oh in view of Kraft, Baggen, and Wicker, further in view of Stenerson (USPN 4,597,083). These claims are patentable over the cited art for at least the foregoing reasons provided above.

Claims 48-53 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Alvarez et al (USPPN 2002/0165962) in view of Kraft and Baggen. Claim 54 is rejected under the same rationale as claim 48, further in view of Wicker. The cited art fails to teach or suggest "wherein said decoding means uses a non-iterative algorithm to generate the error polynomial based on a plurality of minimum-degree polynomials," as recited in claim 48. Accordingly, Applicants respectfully traverse this rejection.

The rejection of the above-quoted feature of claim 48 depends upon Kraft:

> Alvarez et al. do not explicitly teach... means for generating an error polynomial... [using] a non-iterative algorithm... Kraft in an analogous art teaches that the current invention teaches the non-iterative use of a decision-tree with closed formulas over the Galois field for the polynomial coeffecients (col. 4, lines 35-38, Kraft). Kraft also teaches that this invention teaches a combinatorial circuit with no clocks and no sequential operations (col. 4, lines 39-41 of Kraft). Kraft teaches that the object of the present invention... Galois Field GF (col. 4, lines 50-57, Kraft). Kraft

> teaches that the invention depicted in FIG. 1... more than three errors (fig. 1, 2, col. 6, lines 2-59, Kraft). Office Action, pp. 12-13.

None of the teachings of Kraft cited above appear to contain any teaching or suggestion to generate an error polynomial based on a plurality of minimum-degree equations. The cited portions of col. 4 state:

> The current invention teaches the non-iterative use of a derision [sic] tree with closed formulas over the Galois Field for the polynomial coefficients. Prior art teaches the use of sequential circuits using many clock cycles; this invention teaches a combinational circuit with no clocks and no sequential operations. Kraft, col. 4, lines 35-41; and

> It is therefore the object of the present invention to provide a fast combinational decoder circuit capable of being realized as a VLSI device or a discrete circuit that converts the first three odd components of the syndrome vector of a three-error correcting (or less) binary BCH code into the three non-trivial coefficients of the error-location polynomial over the Galois Field GF(2^m). Kraft, col. 4, lines 50-57.

Thus, the above sections of Kraft clearly make no mention of or suggestion to generate an error polynomial based on a plurality of minimum-degree equations.

The portions of col. 6 cited in the rejection of claim 48 (which are discussed above in the rejection of claim 1) also fail to teach or suggest this feature of claim 48. As noted above with respect to claim 1, these portions of Kraft simply describe a technique for selecting one of several possible pre-generated error locator polynomials based upon the outcome of a binary decision tree traversal and do not teach or suggest generating an error polynomial based on minimum-degree polynomials.

Accordingly, the cited portions of Kraft do not teach or suggest generating an error polynomial based on a plurality of minimum-degree polynomials. The cited portions of Alvarez, which are not relied upon to teach this feature of claim 48, also fail to teach or suggest such a feature.

Nevertheless, the Examiner now relies upon Baggen to teach "generating the error polynomial based on a plurality of minimum-degree polynomials." However, there is no teaching or suggestion in either Kraft or Baggen to combine Kraft's non-iterative technique (which, as noted above, has nothing to do with minimum-degree polynomials) with Baggen's minimum-degree polynomials, which are not described as in any way being generated by or processed by a non-iterative algorithm.

Stated another way, the mere fact that one reference shows a non-iterative

algorithm and another reference shows minimum-degree polynomials in no way teaches or suggests the act of using "a non-iterative algorithm to generate the error polynomial based on a plurality of minimum-degree polynomials." For at least the foregoing reasons, the cited art does not teach or suggest claim 48.

Finally, there is no suggestion or motivation to combine the references. The Examiner states that it would be obvious to combine the references "by including the extra step of generating the error polynomial based on a plurality of minimum degree polynomials" in order to "decode data and correct errors." However, all of the cited references already provide techniques for decoding data and correcting errors that do not involve such an extra step. Accordingly, one of ordinary skill in the art at the time of the invention would have no reason to add an unnecessary extra step, since the existing solutions (without this extra step) already solved the problem of decoding data and correcting errors. In other words, adding the extra step as suggested by the Examiner does not appear to solve any problem and would appear to only increase the expense and/or complexity of the existing techniques set forth in Kraft and Oh. Accordingly, one of ordinary skill in the art would not have been motivated to modify either Kraft or Oh in view of Baggen.

For at least the foregoing reasons, claim 48 is patentable over the cited art. Claims 49-54 are patentable over the cited art for at least the foregoing reasons.

CONCLUSION

In view of the amendments and remarks set forth herein, the application and the claims therein are believed to be in condition for allowance without any further examination and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephone interview, the Examiner is invited to telephone the undersigned at 512-439-5087.

Respectfully submitted,

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